UNIVERSITY LINK LIGHT RAIL

FACT SHEET

University Link Tunnel Boring Machines

FEBRUARY 2011

The University Link project includes 3.15 miles of new light rail tunnels. These tunnels will be built using three Tunnel Boring Machines (TBM's). Two machines will be launched from the UW site and dig side by side tunnels south to Capitol Hill. The third machine will launch from Capitol Hill and dig south to Pine Street, where it will be disassembled, transported back to Capitol Hill, and reassembled to dig the second tunnel.

The Tunnel Boring Machines (TBM's):

- Are about the length of a football field at full size.
- The TBM for Capitol Hill is manufactured by Hitachi Zosen industries in Osaka, Japan and weighs about 679,500 pounds. It will arrive in Seattle by ship. Approximately 25-30 truck loads are needed to deliver the machine to the Capitol Hill construction site.
- The TBM's for UW are manufactured by Herrenknecht and weights about 1,109,900 pounds. It will take approximately 44 truck loads to bring the TBM's and trailing gear to the site.
- Include a muck conveyor and a system to erect the tunnel's concrete lining.
- Are comprised of three main sections: a forward shell that contains the cutting head and the main drive; a stationary shell that houses the propulsion system and steering; and a trailing shield that contains the lining erection equipment.
- Are equipped with a 21-foot diameter cutterhead (the green part) that is positioned at the front of the machine.
- Are equipped with various cutting tools, with the cutterhead turning at the rate of 0.1 to 2.5 revolutions per minute. The excavated material goes through openings in the face of the machine.
- Are made so that the spoils are brought into the machine by a corkscrew-like conveyor located behind the cutter head. The spoils are then taken out the back on a conveyor system to be temporarily stored on site and then loaded into dump trucks. Foam is usually added to condition the soil cuttings into a paste so it can pass through the conveyor for removal.
- Are propelled and "steered" with 16 hydraulic jacks that are located around the perimeter of the machine. The operator steers the machine using sophisticated positioning technology that is accurate to within an inch.

The Link Tunnel:

- Is lined with segments that are made from pre-cast concrete brought into the tunnel. The TBM positions each segment into place using an "arm" or erector, creating a ring. Cement grout is then placed behind the ring, forming the tunnel's permanent liner. The TBM uses the surface of the liner ring to propel itself forward, by pushing against it.
- Segments are manufactured in Tacoma by Traylor-Technopref Precast. The segments are 10 inches thick and include rubber gaskets that make it water-tight.

Tunnel Boring Machine for Capitol Hill Site

Tunnel Boring Machines for UW Site